The Role of Photography in Climate Change Research

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nsidc.org/data/glacier_photo

Silent Witnesses

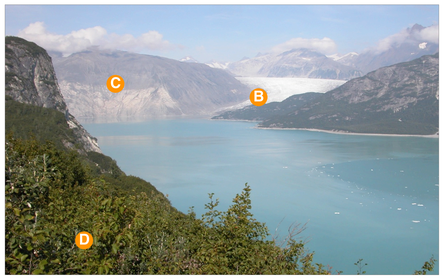
OFTEN A PHOTOGRAPH of parts of the Earth--a landslide, an underwater reef, or the tongue of a glacier—is just what a scientist needs to strengthen a theory or to crush it. In today's digital world where more people are taking and publishing photographs, how are scientists using photography to understand how the Earth's climate is changing?

We examine examples from the past, such as photos from the National Snow and Ice Data Center's Glacier Photograph Collection. We investigate how scientists use photography now, through techniques like time-lapse and panoramic photography. Finally, we explore how scientists share these images with the public.

A Tale of Two Photographs: A Geologist's Notes on Muir Glacier

Repeat Photography compares and contrasts historical and modern photographs that have the same field of view to quantitatively and qualitatively determine their similarities and differences. We talked to **Bruce Molnia**, a research geologist with the U.S. Geological Survey, about his repeat photography of **Muir Glacier** and other glaciers in Alaska.

13 August 1941. Photographed by William O. Field.
NSIDC Glacier Photograph Collection.



31 August 2004. Photographed by Bruce Molnia.
NSIDC Glacier Photograph Collection.

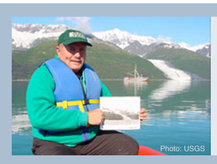
Dramatic Changes

A The 1941 photograph shows the lower reaches of Muir Glacier, then a large tidewater calving valley glacier and its tributary Riggs Glacier. The seracs in the lower right-hand corner mark Muir Glacier's terminus.

B In the 2004 photograph, Muir Glacier has retreated out of the field of view and is now located more than 7 kilometers to the northwest.

C This trimline corresponds to the height of the ice in the 1941 time period. Molnia calculated that the total thickness of glacier ice that was in the middle ground of the 1941 photograph was more than 2, 300 feet.

D Between 1941 and 2004, the landscape underwent a massive change with the evolution of a dense mature forest.



Bruce Molnia is a research geologist at the U.S. Geological Survey and spends most of his time doing fieldwork related to changing glaciers in Alaska. Many of his repeat photographs of glaciers are archived at the National Snow and Ice Data Center's Glacier Photograph Collection (http://nsidc.org/data/glacier_photo).

What does repeat photography reveal about glaciers in Alaska?

"Of the 200 glacier locations that we have revisited…all but four are dominated by substantial glacier retreat. When you start looking at all of these as a body of information, what they tell you is that through out southern and south central Alaska most of the glaciers that we've studied have retreated anywhere from 60 miles as a maximum to a few hundred feet as a minimum." –Bruce Molnia

2 September 1892. Muir Glacier photographed by Harry Fielding Reid. NSIDC Glacier Photograph Collection.

11 August 2005. Muir Inlet photographed by Bruce Molnia. NSIDC Glacier Photograph Collection.

Compressing Years with Time-Lapse Cameras

Scientists use other types of repeat photography to document changes in the Earth's landscape and now have the tools to share these images with the public.

Time-lapse photography has the effect of compressing and speeding up time. Photographer James Balog set up time-lapse cameras around the world to take a shot of the glaciers every hour, on the hour, for two years. This enabled viewers to see two years of change in a few minutes. Balog's project, called the Extreme Ice Survey, captured footage of glaciers in flux, providing scientists with important information on the mechanics of glacial melting.

Mendenhall Glacier, Alaska

12 August 1958. Photographed by Marion T. Millett. NSIDC Glacier Photograph Collection.

20 May 2007 to 4 May 2008. Time-lapse photography by James Balog. Courtesy Extreme Ice Survey.

Use your smartphone's QR Reader to view a time-lapse video clip of changes in Mendenhall Glacier .

A 360° View of Change

Panoramic photography extends a scientists' fields of view beyond the human eye. In the past, scientists had to lug heavy large-format cameras and process photographic plates later on to achieve panoramic views of glaciers.

Digital photography has freed photographers from this inconvenience and has made it easier to capture high-resolution, wide-angle photographsin remote locations.

Scientists are sharing these images through the Web, giving the public a vicarious appreciation of the changing landscape.

McCall Glacier, Alaska

July 1958. Panoramic photograph by Austin Post. NSIDC Glacier Photograph Collection.

August 2004. Panoramic photograph by Matt Nolan. NSIDC Glacier Photograph Collection.

August 2007. Panoramic photograph by Matt Nolan.

Use your smartphone's QR Reader to view an interactive 360° panoramic photo of McCall Glacier.

Citizen Scientists

The evolution of phones into gadgets that can take pictures, record GPS locations, and instantly share data are enabling ordinary citizens to help scientists in data gathering. For example, a project called Picture Post encourages environmental monitoring by citizens, students, and community organizations through repeat photography. Virtual globes like Google Earth also help in the sharing of information.

Photography is helping scientists and the public forge partnerships in documenting dynamic changes in our landscapes.

picturepost.unh.edu

Courtesy Ted Scambos, Terry Haran

A Tale of Two Photographs is based on Ryan Vachon and Allaina Wallace's interview with Bruce Molnia and material from http://www.usgs.gov/global_change/glaciers/repeat_photography.asp

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